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FEBRUARY 25, 1922

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# PUBLIC WORKS.

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No. 8

## Scoring Water and Sewage Treatment Works

By Francis E. Daniels\*

**A suggested system of scoring water purification and sewage treatment plants whereby comparisons can be made of different plants or of different periods of operation of the same plant**

For the past fourteen years the writer has been actively engaged in making inspections of water purification plants and sewage treatment works, and during that time he has on ever so many occasions been asked how a plant stands as compared with the other plants of the state. Quite frequently state health officials want to know the relative standing of the various water and sewage works and in some states it is required to be shown at monthly intervals whether or not such works are satisfactory. To have but the two grades, satisfactory and unsatisfactory, leaves too much unsaid, invites argument, puts too much on the general judgment of the inspector, and frequently results in misunderstanding and ill feeling. Hardly any difficulty would arise in cases of very excellent or hopelessly bad plants; but with the great majority of works, which are neither perfect nor yet blameworthy, unless certain rules or methods of analyzing are employed to limit as much as possible the personal equation of the men, no two inspectors will pass alike on the same plant. They still might agree that the plant is satisfactory or unsatisfactory because, although not wishing to place it in one category, they are unwilling on general grounds to have it in the other. They simply choose the lesser evil. The inspector in many cases, then, has either to put practically all his plants down as unsatisfactory, which looks decidedly bad, or else he stultifies himself in trying to have minor improvements made on plants which he and his department have set down as satisfactory.

To remedy the above and to endeavor to devise a system of scoring whereby a graded list of water purification plants and a similar list of sewage treatment works could be made, about two years ago the writer drew up tentative score cards for this purpose.

The rough drafts of each were submitted to the chief engineers of several states for criticisms and suggestions. Many helpful suggestions were received and another set was made. These forms, while far from perfect, perhaps, are here given to suggest possibilities, and it is hoped that they will prove useful as a basis upon which to build a system of scoring so that different inspectors can arrive at a proper relative grading of their works for comparisons in their own state as well as with other states adopting the same system.

Having obtained a true graded list, with each plant accompanied by its percent, it then only becomes necessary to divide the list according to rating into groups, such as excellent, good, fair, unsatisfactory or blameworthy.

It is believed that a duplicate copy, made at the time of inspection, should be left with the superintendent of the plant or forwarded promptly to the one in responsible charge. This will show in detail how the rating was computed and exactly what should be corrected in order to raise the standing. It will further promote rivalry if the monthly list of standing is sent to those in responsible charge of every plant. It is believed that incentive will be given to procure additional apparatus and to keep in better order and operation the equipment already in use.

By the use of small type and closely ruled lines, the whole card can be printed on a single sheet and still have ample room to place the score numbers with a pen or hard pencil. The sheets are put up in tablet form and registered so that a sheet of carbon paper may be placed between two successive pages to make an accurate copy at the time the original is made. One page is kept by the inspector and the other passed on to the local authority if such is allowed. This the writer would recommend, although some state authorities do not consider it good policy to do so.

\*Assistant Engineer, Penna. Dept. of Health.

STATE OF .....  
 DEPARTMENT OF HEALTH—DIVISION OF ENGINEERING  
 Water Purification Plants  
 Score Card

Name of Plant..... Rating .....

Location ..... Borough } ..... County .....  
 Township }

Inspected by..... Date.....

Equipment	Perfect Score	Allowed	Operation	Perfect Score	Allowed
Source of Supply (3) Pollution constant .....	0		Source of Supply (2) Patrol or other means to control pollution .....	2	
Pollution casual .....	3		Intake (1) Conditions around .....	1	
Pump Station (8) Raw water pumps— Capacity .....	2		Pump Station (4) Raw water pumps— Operation and attention.....	2	
Condition .....	2		Filtered water pumps— Operation and attention.....	2	
Filtered water pumps— Capacity .....	2		Sedimentation Basin (3) Condition .....	3	
Condition .....	2		Filter Units (20) Condition of gravel and strainers	3	
Sedimentation Basin (4) Capacity .....	4		Condition of sand.....	5	
Filter Units (18) Depth of gravel.....	2		Character of sand agitation.....	2	
Depth of sand.....	2		Efficiency of wash.....	3	
Size of sand.....	1		Frequency of wash.....	1	
Dist. of sand below trough.....	1		Proper control of rate.....	3	
Sand agitation .....	2		Condition of rate controllers....	2	
Sufficiency of wash water.....	4		Condition of loss of head gauges	1	
Rate of filtration.....	1		Clear Water Basin (1) Condition of .....	1	
Rate controllers .....	2		Coag. apparatus (2) Operation .....	2	
Rate of flow recorder.....	2		Alk. Apparatus (2) Operation .....	2	
Loss of head gauges.....	1		Disinfecting Apparatus (5) Operation and proper dose.....	5	
Clear Water Basin (1) Capacity and protection.....	1		Storage Reservoir (2) Condition .....	2	
Coag. Apparatus (2) Equipment and point of application of chemical.....	2		Laboratory Control (5) Turbidity .....	3	
Alk. Apparatus (2) Equipment and point of application of chemical.....	2		Color .....	.5	
Disinfecting Apparatus (5) In duplicate .....	3		Alkalinity .....	1	
Adequate .....	2		CO <sub>2</sub> .....	.25	
Storage Reservoir (2) Adequacy and protection.....	2		Plating .....	.5	
Laboratory Control (5) Turbidity .....	1		Fermentation .....	.5	
Color .....	.5		Free chlorine .....	.25	
Alkalinity .....	1				
CO <sub>2</sub> .....	.25				
Plating .....	.5				
Fermentation .....	.5				
Free chlorine .....	.25				
Sum .....			General condition in and around plant as to cleanliness and appearance not included in the above .....	3	
			Sum .....		

Equipment Score .....

Operation Score .....

Total Score .....

Sufficiency of Treatment (including cond. of permit).  
(Department requirements)

Corrected Score .....

Sum allowed x 50 = Score

Penalties .....

Sum perfect  
Minimum Satisfactory Rating = 75

Final Rating .....

Penalties: for using bypass, -10 to -100; for no coagulant, -10 to -50; for no disinfectant, -50 to 100; for any gross carelessness or neglect, -50 to -100.

## SEWAGE TREATMENT PLANTS SCORE CARD

Name of Plant ..... Rating .....

Location ..... Borough }  
..... Township } County .....

Inspected by ..... Date .....

Weather for 24 hours .....

Equipment	Perfect Score	Allowed	Operation	Perfect Score	Allowed
Grease Traps (2) Type and adequacy.....	2		Grease Traps (2) Care .....	2	
Grit Chamber (1) Adequacy .....	1		Grit Chamber (1) Care .....	1	
Screens (2) Type ..... Construction .....	1 1		Screens (2) Care .....	1	
Fine Screens (6) Type .....	3		Fine Screens (6) Disposal of screenings.....	3	
Sett. or Septic Tanks (6) Capacity .....	3		Sett. or Septic Tanks (6) Care .....	3	
Sett. or Septic Tanks (6) Character .....	3		Character of effluent.....	3	
Imhoff Tanks (6) (Settling and Digesting)— Adequacy .....	3		Imhoff Tanks (6) Care .....	1	
Imhoff Tanks (6) Construction .....	3		Conditions in gas vent.....	1	
Contact Beds (6) Adequacy and materials.....	2		Conditions in flow comp.....	1	
Contact Beds (6) Dosing apparatus.....	2		Conditions in sludge comp.....	1	
Contact Beds (6) Discharge apparatus.....	2		Character of effluent.....	2	
Trickling Filters (6) Adequacy .....	1.5		Contact Beds (6) Care .....	1.5	
Trickling Filters (6) Materials .....	1		Condition of dosing app.....	1.5	
Trickling Filters (6) Dosing apparatus.....	1		Condition of discharge app.....	1.5	
Trickling Filters (6) Distrib. apparatus.....	1		Condition of beds .....	1.5	
Trickling Filters (6) Efficiency of distrib.....	1.5		Trickling Filters (6) Care .....	1.5	
Sand Filters (6) Adequacy .....	1.5		Condition of materials.....	1	
Sand Filters (6) Materials .....	1.5		Condition of disb. app.....	1	
Sand Filters (6) Underdrainage .....	1.5		Condition of underdrains and channels .....	1	
Sand Filters (6) Dosing .....	1.5		Condition of effluent.....	1.5	
Chemical Treatment (4) Adequacy .....	2		Sand Filters (6) Care .....	1.5	
Chemical Treatment (4) Character of appliances.....	2		Condition of sand.....	1.5	
Final Settling Tank (1) Adequacy and materials.....	1		Condition of underdrains.....	1.5	
Sludge Bed (3) Adequacy and construction.....	3		Condition of effluent.....	1.5	
Broad Irrigation (4) Adequacy .....	4		Chemical Treatment (4) Care .....	2	
Sub-Surface Irrigation (4) Adequacy .....	4		Chemical Treatment (4) Efficiency .....	2	
Pump Station (2) Adequacy and general installation .....	2		Final Settling Tank (1) Care and condition.....	1	
Tests and Analyses .....	1		Sludge Bed (3) Care .....	1	
Sum .....			Sludge Bed (3) Character of sludge.....	1.5	
Sum .....			Sludge Bed (3) Disposition of sludge.....	.5	
Sum .....			Final Effluent (5) General character .....	5	
Equipment Score .....			Broad Irrigation Field (4) Care and condition.....	4	
Sufficiency of Treatment (including cond. of permit) (Department requirements) .....			Sub-surface Irrigation (4) Care and condition.....	4	
Sum allowed x 50 = Score			Pump Station (2) Care and general conditions..	2	
Sum perfect			Tests and Analyses.....	1	
Minimum Satisfactory Rating = 75			General conditions in and around the plant as to cleanliness and appearance not included in the above .....	3	
			Sum .....		
			Operation Score.....		
			Total Score.....		
			Corrected Score .....		
			Penalties .....		
			Final Rating .....		

Equipment Score .....

Operation Score.....

Sufficiency of Treatment (including cond. of permit)  
(Department requirements) .....

Total Score.....

Sum allowed x 50 = Score  
Sum perfect

Corrected Score .....

Minimum Satisfactory Rating = 75

Penalties .....

Final Rating .....

In the sample sheets shown, the figures placed opposite the various items are the values of such items if perfectly satisfactory. They are only suggestive and could be changed to meet the judgment of any board appointed to pass upon and adopt the system. Once having been adopted, they would then remain.

The manner of filling in the blanks is as follows:

The headlines are filled in as indicated, except that the space marked "Rating" is held open until the final rating is computed from the details, when it is transferred to the top for purposes of easy view and tabulation.

Then each item is considered and, if it applies to the plant under observation, the perfect figure for it is transferred on the same line into the column marked "Perfect Score" and after careful consideration a figure is placed opposite in the column "Allowed" which, in the judgment of the inspector, is a fair mark for that item, which may be anywhere from 0 to the perfect mark indicated.

If the item does not apply to the case under consideration, such as pumps at a gravity plant, septic tanks at an Imhoff tank plant or something similar, then it is not considered and both columns are blank on that line. But on the other hand if the apparatus is required although it has not been installed, then the perfect mark is placed in the "Perfect" column and a zero in the "Allowed" column.

So on for all the items in both the equipment list and operation list in detail.

Then both columns in each list are added up, the sums in each case showing, respectively, what would have been received had all been perfect and what was really allowed in the inspector's judgment.

Since in this case the equipment and operation are both weighted equally, the sum "Allowed" multiplied by 50 and divided by the sum of the "Perfect" will equal the equipment score and operation score, respectively, in each list and the sum of the two scores will give the total score of the plant.

Now comes a most important factor. A competent board must pass upon every plant in the state and give each a factor which will be the leveling stick to put all the plants on a relative basis.

This will be known as the "sufficiency of treatment" factor, and depends entirely upon local conditions and requirements.

Some conditions require a large equipment and a high degree of treatment while others need very little. For example, a plant may be quite elaborate, having pumps, filters, and many other accessories, but really only half equipped for the vital conditions, while another plant might not possess either pump or filters but be amply equipped for all needs and emergencies under conditions at that place. The first would be rated as a 50 per cent plant while the second would be 100 per cent. Therefore, if any plant is wholly up to all that can reasonably be expected in both equipment and operation for all local conditions, then that plant should receive a high rating in the relative list of the state.

The inspector then takes his sufficiency of treatment factor from the official list of the department and multiplies the total score by it. This gives him the corrected score.

Now, if there is detected any neglect, gross carelessness or other similar shortcoming, then there is

subtracted from the corrected score the value of such as indicated by the table of penalties. This gives the final rating, which is transferred to the top of the sheet for ready reference.

The plants of the whole state are then listed in the order of their standing and so published with the rating of each shown. Appropriate groupings may be made as above mentioned, giving special notice that those below a certain percent, say 75, are unsatisfactory and should be improved as indicated on the detailed score card.

It will be noted that although water purification plants and sewage treatment works are treated separately, the above remarks apply equally well to the two kinds of score cards.

It seems to the writer that this system is not unlike the systems of grading recitations and examinations in successful use at many of our colleges. It should be a considerable help in training new inspectors to be critical and searching in their visits, and to record accurately in brief detail essential features.

It should be most valuable in showing to all concerned exactly the good and bad items and how the scores and final ratings are derived, with the errors due to personal equation eliminated as far as possible.

Finally, the writer offers the scheme with the hope that it be put to use as it is, or with any changes or additional features which may make for improvement.

### State Highway Traveling Bridge Camp

Among the \$3,000,000 worth of the war department's supplies allotted to the highway department of North Carolina, there were included 500 motor trucks, more than 100 touring cars, and a number of trailers intended to be hauled by trucks for transporting supplies and munitions to the front. Some of this equipment has been ingeniously modified at small cost for the construction of several peripatetic bridge construction and maintenance camps, that have proved to be very convenient and satisfactory. They afford comfortable quarters for the men, who are thus secured of a better grade than can be retained when the living conditions are disagreeable, and provide for their simultaneous transportation and that of all their regular equipment.

A standard camp consists of the hauling truck, sleeping car, dining and kitchen car, and tool car. The hauling truck is a 3-ton army standardized B, heavy cargo truck, unchanged except by the addition of side supports for carrying painting scaffolds. The truck has a high rounded canvas cover and its body is used for the storage and transportation of heavy tools, rope and other bulky equipment.

The sleeping car has a body similar in appearance to that of a small railroad box car, built on the chassis of a trailer. It has three small windows on the long side and a door in each end and is equipped with four double deck steel bunks, one in each corner with a wood stove in the center, affording

very comfortable, well ventilated quarters for the eight men comprising the regular bridge gang. The car is 8 feet wide and 17 1-2 feet long.

The kitchen and dining car has the same dimensions and general exterior appearance, except that one of the side windows is replaced by a door and that there is only one end door. At the forward end of the car there are folding wall tables, with shelves above them for the storage of supplies. At the opposite end of the car is the kitchen, with stove, dishes, cooking utensils and other necessities. The stove is provided with an extension pipe projecting through the roof of the car and lowered when the car is in transit. Both the dining and sleeping cars were built on the chassis of 3-ton trailers, unchanged except by the addition of a

drawbar in the couplings to provide for the overhang of the body.

In the rear of the dining car is the small tool car modified with but little change from the chassis of a 1 1-2-ton army cargo trailer combined with the body of an army combat wagon. The workmanship, fittings and finish of all the cars are excellent and the changes made to prepare them for the highway service cost only about \$250 per car.

The North Carolina Highway Department has also utilized ambulances for survey cars, aeroplane hangars for truck sheds, and the semi-cylindrical steel roofs of bomb proof shelters mounted on walls and floors for the storage of several thousand pounds of T. N. T. and black powder received from the government.

## Where the Good Roads Dollar Goes

By J. E. Pennybacker\*

### Analysis of costs of over three thousand miles of Federal aid roads completed by June, 1921

Out of each dollar spent to build good roads, labor at the job gets an average of 42 cents; the engineers, inspectors and supervising organization gets 6 cents; the railroads 15 cents, and the producers of materials and equipment 37 cents. This distribution is graphically shown in Fig. 1. These proportions would, of course, vary with the type of highway and the local labor and material market but they fairly represent the distribution on a nation-wide all-inclusive basis.

The cost distribution was arrived at by assembling cost data on specific jobs including Federal aid, and then dividing the total cost among the items of (a) Grading; (b) Structures and (c) Surfacing.

These were each subdivided into (1) engineering and supervision; (2) labor on the job; (3) freight; (4) materials; (5) miscellaneous. Analysis of the cost of 3287 miles of completed Federal aid projects to June, 1921, showed that the highway expenditures on these roads were distributed as follows: Structures 12 per cent., Grading 22 per cent., and Surfacing 66 per cent. This is shown graphically in Chart No. 2.

The significance of the figures, on Chart 1 is the evidence they afford that building good roads does more than merely trade dollars for pavements. First, it gives employment in generous measure to unskilled labor, the kind which feels the pinch of hard times most cruelly; second, it means a considerable stimulus to railroads, and, third, covers

\*Secretary of the Asphalt Association.



FIG. 1—DISTRIBUTION TO LABOR AND MATERIALS.



FIG. 2—DISTRIBUTION TO WORK PERFORMED.

the margin between stagnation and activity in quite a number of industries.

While it must be admitted that the production of any utility helps to give employment, there is no other comparable outlay which so completely distributes the dollar to offset effects of hard times as does highway work.

Manifestly, this showing has national significance only in the event that the expenditures assume magnitude sufficient to affect nation-wide economic conditions. In 1922 the sum available for country highways, according to Thomas H. MacDonald, Chief, U. S. Bureau of Public Roads, is \$720,000,000. If to this is added only \$280,000,-000 for all municipalities there is an indicated total sum available of \$1,000,000,000. This I believe is an ultra conservative estimate. Now if we spend it for roads and streets we shall in addition to buying so much pavement accomplish the following direct results:

First, we shall, on the basis of 42 per cent or \$420,000,000 for labor give employment on paving jobs to 1,050,000 laborers for eight months at \$2.00 per diem. This is merely an estimated basis as to the daily wage and the number of days employment but its soundness is not impaired by variations in details. Such a program, while not wholly solving unemployment problems, would mean protection against want for very nearly every unskilled laborer because it would take up the excess supply of such labor. Executive, technical and clerical workers on the paving jobs would receive 6 per cent or \$60,000,000. It is difficult to average the compensation of these workers but if we parcel it out at say \$2,000 per worker for the year it would keep 30,000 busy. As these employees come from specially trained classes relatively small in number, such as engineers, chemists, inspectors, mechanics and accountants, such a number would be quite influential in reducing distress among them.

Railroads would receive \$150,000,000 out of a billion dollar road program and more than half this proportionate sum would be passed on to rail employees, thus further helping employment. From a rail traffic standpoint it is interesting to consider that each square yard of paved highway means a weight of materials aggregating an average of easily 800 pounds, or for a mile of 18 foot wide pavement about 4,200 tons. If the billion dollars goes into construction at an average of say \$16,000 per mile it would be equivalent to 62,500 miles or a weight of materials of say 262,000,000 tons. Both of these huge totals would be reduced, the mileage by diversion of funds to maintenance, and the tonnage by the use of local materials close to the roadside; but however large the deductions, the remainders spell big transportation business for the railroads.

The 37 cents which goes to industries becomes \$370,000,000 in such a program. That much money means that rock quarries, gravel pits, cement mills, asphalt and tar refineries, brick plants, road machinery factories, truck manufacturing plants, steel mills, explosives mills and contracting organizations will be kept busy. While not all of the cement output, in fact only about 20 per cent, goes into paving, and while of asphalt about 45 per cent goes

into paving, and while all these other industries produce materials and equipment for other purposes than paving, it must be evident that with a vigorous boom along paving lines each of these industries would be on a satisfactory production basis and going on full time.

Now these are direct results of a great road program wholly apart from the far-reaching benefits which the paved highways confer through their service to transportation of farm products; to local travel; to country schools; to development of new resources; to the advancement generally of rural community welfare and toward the almost equally important economic development of suburban settlement.

The crux of the whole question is in the carrying out of this great program. The money is available, rail transport is sufficient, materials can be produced. Now comes the disturbing statement from many highway departments that on account of the alleged high prices for a single material, portland cement, extensive road building projects will be suspended. It is in no derogatory spirit toward portland cement that I call attention to the fact that other types of pavement than portland cement concrete may be constructed to serve every purpose at reasonable cost. Asphalt for example is actually *lower in price* than *prewar basis* and it is used in several types of pavement adaptable to local conditions as to cost limits, availability of materials and variety and intensity of traffic.

Thus the penetration type retains all of the good qualities of macadam and adds that of dustlessness and powerful resistance to disintegration. Asphaltic concrete and sheet asphalt cost little if any more than unsurfaced reinforced portland cement concrete. A large proportion of the most heavily travelled streets and highways in the world are so surfaced. During 1921 they led all paving construction with 68,000,000 square yards. It is a duty to go ahead with a one hundred per cent road program and get the keenest competition among materials and types. Economic laws will do the rest.

### Colorado River Commission

Secretary Hoover was chosen permanent chairman of the Colorado River Commission at its first meeting in Washington, January 26. The discussion of the problems indicated the earnest desire on the part of the commissioners from the states of the Colorado River basin to cooperate and make the concessions necessary to a broad plan which will permit the greatest possible utilization of the water of this stream. To expedite the work of the Commission three committees were formed. One will study the questions coming under the general head of volume of water; another will consider the water requirements of each state, while the third will devote itself to a study of the legal questions involved. The Commission will meet at Phoenix, Arizona on March 15th.

### Muscle Shoals

The Secretary of War, on February 2, sent the Henry Ford Muscle Shoals offer to Congress. He

made no recommendation but pointed out numerous advantages and disadvantages of the proposal. He recommends the completion of Wilson Dam by the Government if it should be decided to accept no private bid. This is based on the necessity for nitrogen preparedness, the advantages of navigation and the utilization of a great national resource. He believes the Ford offer should be further modified to conform to the Water Power Act which would limit the lease to 50 years..

### Handling Concrete with an Air Hoist

Placing small or detached amounts of concrete are often slow or expensive operations on account of the difficulty of elevating the heavy material without some power appliance, and the time and expense necessary to install the heavy hoisting apparatus usually employed for concrete distribution. Such work is therefore sometimes done at a very high unit cost that, although it may be greater than the price paid for the concrete, is still cheaper than to provide heavy equipment and remove it for so small an amount of concrete.

The ingenious contractor will often be able to devise a special method for handling different jobs, and will utilize and combine available equipment for special purposes, thus effecting important economies. While these plans cannot always be duplicated on different jobs they can frequently be modified or adapted and in any event are very likely to give ideas and suggestions that will help a contractor in some other case.

In the construction of a concrete warehouse the

concrete was mixed at ground level, but there was no regular derrick or hoist available to elevate it above the roof for the construction of the upper part of the building. The difficulty was overcome quickly and with very little expense by the expedient of improvising a derrick from a 20-foot vertical mast of 6x6 or 4x4-inch timber to which was bolted and braced a short fixed transverse arm. This mast was set on the roof of the building and guyed. From the extremity of the arm there was suspended a concrete bucket filled from the mixer and hoisted by two parts of a  $\frac{1}{4}$ -inch steel cable led over sheaves in the horizontal arm and down to the drum of a Little Tugger hoist bolted to the foot of the mast and operated by compressed air. The concrete was dumped into a hopper bin on the roof and thence discharged to wheelbarrows by which it was distributed to the forms and placed three times as fast as could be done without the air hoist.

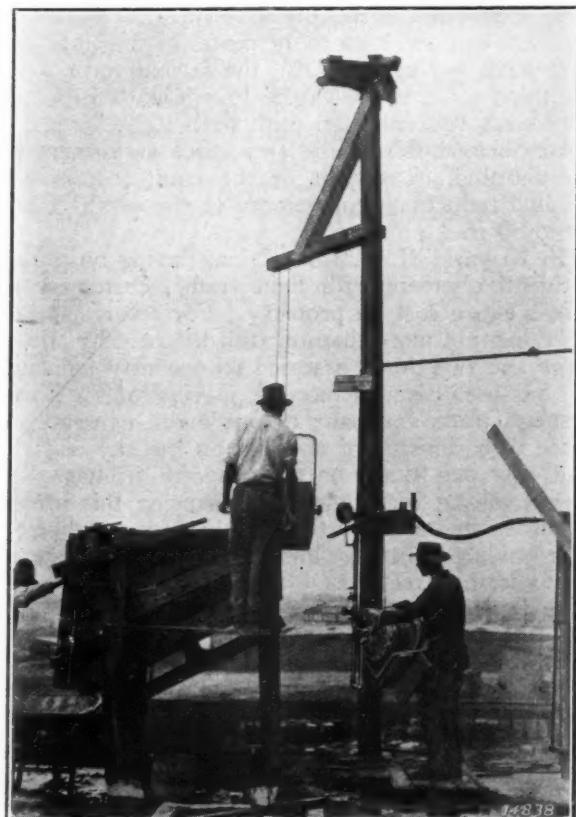
Wherever compressed air is available for operating pneumatic tools, drills or for other purposes at from 50 to 125 pounds pressure, it will drive the compact, portable  $2\frac{1}{2}$ -h.p. hoist that weighs only 285 pounds, will take 700 feet of  $\frac{1}{4}$ -inch rope and will hoist a 1,000-pound load at the rate of 85 feet per minute with 80 pounds air or steam pressure.

### Paving Notes\*

In Owosso, Mich., in laying unreinforced concrete, the contract price for 17,000 square yards was \$2.47 and \$.95 for 12,000 yards of excavation. In Lexington, Nebr., in connection with laying 42,500 square yards of 3-inch vertical-fibre brick on a 5-inch concrete base at \$4.25 a square yard, the grading was paid for at an additional price of \$.70 a cubic yard and the curb at \$.90 per lineal foot.

Freehold, N. J., let two contracts, one in March and one in July, 1921, both for reinforced concrete. For the former the prices were \$3.35 for the pavement, \$2.00 for excavation and \$.45 for curb, while in the July letting the price was \$2.78 for pavement, \$1.50 for excavation and \$.50 for curb. In Fulton, N. Y., 2-inch asphaltic concrete on a 6-inch base cost \$2.85, while a  $1:1\frac{1}{2}:3$  concrete averaging  $7\frac{1}{2}$  inch thickness cost \$2.80 and excavation cost \$1.80 a cubic yard additional. Asphaltic concrete resurfacing in the same city cost \$1.75 a square yard. In Glens Falls, N. Y., in laying 1,307 square yards of brick, there were 202.7 cubic yards of excavation and fill at \$2.00, 236.6 cubic yards of  $1:3:6$  base at \$14.00, 1,354 feet of expansion joints at \$.25, 27.23 cubic yards of cushion mixed 1 to 2 at \$19.35 and 1,307 square yards of Mack hillside brick at \$3.65 laid.

In Marion, N. C., in connection with laying 15,000 square yards of concrete pavement, grading cost \$.40 a cubic yard and integral curb \$.47 a foot extra, the cost of the concrete pavement alone being \$2.70. In laying brick pavement in Akron, Ohio, the brick and concrete base cost \$172,955, while grading at \$.50 a cubic yard and curb at \$1.40 per lineal foot added \$103,340 to the cost. In New Boston, Ohio, in addition to 10,870 feet of brick with concrete base



IMPROVIZED DERRICK FOR HOISTING CONCRETE

\*Continued from page 124.

at \$3.54 per square yard, the street improvement included 4,816 lineal feet of concrete curb and gutter at \$.85, excavating at \$.75 a cubic yard, three manholes at \$55 and 8 catch basins at \$55.

In Wilkinsburg, Pa., in laying concrete pavement, the cost was \$2.80 per square yard for the pavement, while the grading cost \$1.50 per square yard extra. In Waxahachie, Texas, a 2-inch warrenite-bitulithic wearing surface on a 5-inch concrete base cost \$5.35 to \$5.55, excavation cost \$1.00, headers \$.25, curb \$.90 and combined curb and gutter \$1.25. In Barre, Vt., in laying reinforced concrete pavement using 30 pound mesh, the pavement cost \$2.38 per square yard, the grading \$.50 and the shoulders \$.40. In Suffolk, Va., grading for concrete pavement cost \$.60 per cubic yard. In Green Bay, Wis., the cost of a 1½-inch sheet asphalt surface with 1½-inch binder course on 6-inch concrete base was \$3.75 per square yard, in addition to which the grading cost \$1.50 per cubic yard and a 5½-inch curb with combination 18-inch gutter cost \$1.25 per linear foot. In Manitowoc, Wis., a 7½-inch concrete pavement cost \$3.16 per square yard including grading and another cost \$2.85 per square yard without grading. In Wisconsin Rapids, Wis., in laying 28,000 square yards of concrete pavement, this cost \$2.69 for the pavement only while the grading averaged \$.32 per square yard extra.

### Notes on "Payment for Paving"

Boulder, Colo., assesses by the front foot on the paving abutting the property, and by the 25 ft. zone when pavement is parallel to property—40% of the first zone, 23% of the second, 15% of the third, 12% of the fourth, 7% of the fifth, 5% of the sixth. Intersections assessed a half block each way.

Pueblo, Colo., assesses entire cost on district improved. Each quarter block is divided into four equal zones from both front and side street. First zone pays 55% and other three zones pay 15% each of total amount chargeable against any frontage.

In New Haven, Conn., abutting property owners are assessed a flat rate for each foot of frontage, the rate depending upon the type of pavement, as follows:

Bituminous macadam.....40 cts. per front foot  
Asphalt resurfacing.....50 cts. per front foot  
Concrete .....75 cts. per front foot  
Asphalt with new concrete base.80 cts. per front foot  
Granite block with new con-

crete base.....\$1.00 per front foot

In Champaign, Ill., the total amount of assessment for paving a given frontage is assessed on the abutting property and all lots up to the middle of the

$\frac{f}{b}e$   
block, each lot being assessed  $\frac{f}{b}e$  of the total as-

essment, in which  $f$  is the depth of the lot at right angles to the street,  $c$  is the distance from the center of the lot to the center of the block,  $b$  is the distance from the center of the block to the property line of the street to be paved, and  $e$  is one-quarter the length of the block.

In Fort Wayne, Ind., assessment is by front foot

after street and alley intersection have been deducted. Corner lots are assessed back 150 ft., the first 50 ft. paying 75%, the next 100 paying 25%.

In La Porte, Ind., the first 40 ft. back pays 75%, the next 40 ft., 12 2/3, and the remaining, up to the center of the block but not beyond 70 ft., pays the remaining 8 1/3%.

The Iowa law permits assessment to be extended 300 ft. back from the street paved but not more than half-way to the next street. In Ames, Iowa, the assessment is calculated by means of a curve, of which some of the coordinates are:

A lot extending 50 ft. back pays	30.56%
A lot extending 100 ft. back pays	55.56%
A lot extending 150 ft. back pays	75.00%
A lot extending 200 ft. back pays	88.89%
A lot extending 250 ft. back pays	97.92%
A lot extending 300 ft. back pays	100.00%

The percentages applying to each lot are then multiplied by the number of feet and by the total assessment per front foot.

In Dodge City, Kan., the cost of paving each block is prorated to the property on that block in proportion to value of each property as set by an appraisal board.

In Pratt, Kan., the city pays for intersections and grading.

In St. Paul, Minn., the charter provides that only the cost of a strip of pavement 12 ft. wide immediately in front of and abutting the property can be assessed. Assessments are made for benefits to property on intersecting streets half-way toward the next parallel street.

Natchez, Miss., pays for paving by issuing certificates to contractor.

In Columbus, Neb., the assessment is based on frontage assessed back to the center of the block, the first sixth paying 33 1/3%, the second sixth 20%, the third sixth 16 2/3%, the fourth sixth 10%, the fifth sixth 10%, and the sixth sixth 10%.

In Garfield, N. J., the two-thirds assessment on the abutting property is by the front foot with a gradual reduction proportioned to the depth of lots up to 80 ft.

In Newark, N. J., for original paving on purely residential streets with light traffic, customary to assess entire cost on property. For resurfacing or repaving, not more than one-third is paid by city at large and two-thirds assessed on property frontage. "It has been planned recently, in view of the heavy through traffic on many of our main highways, to place three-fourths of the cost on the city at large and only one-fourth on the property frontage. If means can be formulated for financing this proposition, either three-fourths or four-fifths of the cost of repaving will be assumed by the city at large on heavy-traffic streets."

In Summit, N. J., "if ordered by Common Council, Board of Assessors assesses abutting property according to benefits received—otherwise city pays whole cost. The latter is the usual procedure." Assessment is generally by front foot.

In New Rochelle, N. Y., three feet of pavement on each side of the street is assessed as gutter.

In Queens Boro, New York City, if the assessment exceeds 60% of the assessed valuation, the owner is allowed 10 years for paying same.

Table No. 3—Methods of Paying for Paving—Continued

Name of City	Percentage of Paving Cost		Method of Calculating Assessments	Payable in how many installments.	Funds obtained by city by	Life of bonds, years.
	Assessed on abutting property.	Paid in city.				
<b>Illinois (Continued):</b>						
Marion	all	.....	By front ft. with reductions on corner lots.	10	budget	..
Mattoon	90%-95%	5%-10%	Front ft., excl. intersections.	10	budget	10
Morrison	80%	20%	Front foot.	10	cash	10
Murphysboro	.....	.....	By benefits.	10	budget	10
Ottawa	95%	5%	By front ft., incl. intersections.	10	.....	10
Peoria	all	.....	By front ft., excl. intersections.	10	bonds—benefits	1-10
Quincy	75%	25%	By front foot.	10	tax—budget	10
St. Charles	85%	15%	By front foot.	10	bonds	10
Streator	.....	5%-15%	By front foot.	10	assess.—bonds	1-10
Waukegan	most	.....	By front ft., excl. intersections.	10	taxation	2-10
Wheaton	all	.....	By front foot.	10	budget	10
Wilmette	90%	10%	.....			
<b>Indiana:</b>						
Bedford	all	.....	By front foot.	2	.....	..
Bloomington	all	.....	By front ft., excl. intersections.	10	budget	10
Brazil	all	.....	By front foot.	10	budget	10
Covington	all	.....	By front ft., excl. intersections.	10	tax	1-10
Crawfordsville	all	.....	By front ft., excl. intersections.	10	budget or special levy	10
Elkhart	all	.....	By front ft., excl. intersections.	10	budget	10
Elwood	all	.....	By front ft., excl. intersections.	10	budget	..
Fort Wayne	all	.....	By front ft., excl. intersections, (see note).	10	budget	10
Gary	all	.....	By front ft., excl. intersections.	10	budget	..
Kendallville	all	.....	By front ft., excl. intersections.	10	budget	10
Lafayette	all	.....	By front ft., excl. intersections.	10	budget	10
La Porte	all	.....	By front ft., excl. intersections, (see note).	10	both bonds	10
Marion	all	.....	By front ft., excl. intersections.	10	bonds	10
Mt. Vernon	all	.....	By front ft., excl. intersections.	10	budget or bonds	10
New Albany	all	.....	By front ft., excl. intersections.	10	budget	10
Noblesville	all	.....	By front ft., excl. intersections.	10	budget	10
North Vernon	.....	.....	.....	10	gen. fund or bonds	..
Peru	all	.....	By front ft., excl. intersections.	10	budget	..
Portland	all	.....	By front ft., excl. intersections.	10	budget	10
South Bend	all	.....	By front ft., excl. intersections.	10	budget	..
Wabash	all	.....	By front ft., excl. intersections.	10	both	10
West Lafayette	all	.....	By front ft., excl. intersections.	10	budget	10
<b>Iowa:</b>						
Ames	.....	.....	(See note).	10	budget	..
Atlantic	all	.....	Area of lots.	7	bonds	7
Boone	all	.....	Frontage plus intersections.	10	.....	..
Cedar Rapids	all	.....	Front foot.	10	budget	..
Centerville	all	.....	Area of lot or tract.	10	bonds	10
Cherokee	all	.....	(See note).	10	bonds	7 or 10
Clinton	all	.....	Area.	10	bonds	10
Des Moines	all	.....	Front ft., incl. intersections.	7	bonds	5-12
Emmetsburg	all	50%-city	Front foot.	7	bonds	10
Fort Dodge	.....	15%	Front ft., divid. area into zones.	10	bonds or impv. levy	..
Indianola	.....	.....	.....	7	bonds & special assessments	..
Iowa City	all	.....	Area (see note).	10	bonds	5-15
Jefferson	.....	.....	By front foot.	7	bond	4
Keokuk	all	.....	Area of lot, excl. intersections.	10	.....	..
New Hampton	all	.....	.....	7	bonds	10
Newton	all up to 25% of property	deficiency	Front ft., & depth, incl. intersec.	7	bonds	10
Oelwein	all	.....	Front ft., excl. intersections.	7-10	bonds	10
Oskaloosa	.....	.....	Zone system (see note).	10	.....	10
Ottumwa	all	deficiency	Area of lots, intersections pro rated on abut. property.	10	budget	..
Perry	all	.....	Front ft. & area, incl. intersecs.	7	.....	..
Storm Lake	all	.....	By front foot.	..	.....	..
<b>Kansas:</b>						
Atchison	all	.....	Area of lots, excl. intersections.	10	bonds	1-10
Chanute	all	.....	Intersections by city.	10	bonds	..
Dodge City	all	.....	Intersections by city (see note).	20	bonds	1-20
Emporia	all	.....	Valuation of property, intersections by city.	10	bonds	10
Hiawatha	all	.....	By front ft., intersecs. by city.	10	bonds	10
McPherson	50%	50%	Valuation of lot.	10	.....	10
Ottawa	all	.....	Feet of ground, excl. intersecs.	10	bonds	10
Parsons	all	.....	On area, excl. intersections.	5-10	budget or bonds	5-10
Pratt	.....	.....	By front foot.	20	bonds	10-20
Salina	all	.....	By front foot.	10	bonds	5
Topeka	all	.....	Intersections by city.	10	bonds	1-10
Wichita	all	.....	By block acc. to value of lots, intersections by city.	10	bonds	1-10
<b>Kentucky:</b>						
Ashland	all	.....	By front ft., intersecs. pro rated.	10	.....	10
Covington	all	.....	By front ft., excl. intersections.	10	.....	10
Owensboro	all	.....	On reconstr. 50%-50%.	10	budget	10
Paris	%	1/2	By front ft., excl. intersections.	10	budget	10
Paris	%	1/2	By front ft.	10	bond	20
<b>Louisiana:</b>						
Lafayette	%	1/2	Gravel pav't ent. by bond issue.	5-10	bonds	20
Lake Charles	all	.....	Includes intersections.	4	.....	..
New Orleans	all	.....	Front ft., incl. intersecs.	10	budget	10
<b>Maine</b>						
Augusta	.....	all	.....	..	budget	..
Gardiner	.....	all	.....	..	budget	..
Portland	.....	all	.....	..	annual appropriation	..
Walterville	.....	all	.....	..	budget	..
<b>Missouri:</b>						
Frederick	50%	50%	Cost, incl. intersections pro rated per front ft. of prop.	due in 20 days	budget	..
			(To be continued)			

In Mandan, N. D., paving on side streets is assessed against corner lots in the business district, but in the residence district to one-fourth of the lot.

South Sioux City, Neb., pays for intersections by issuing general obligation bonds on which a levy is made each year.

In McAlester, Okla., "the total cost of a quarter block is assessed 40%, 30%, 20% and 10% to the center of block for side street and per front foot for frontage."

In Bellingham, Wash., the area is divided into zones, the first 30 ft. paying 45%, the second 30 ft. 25%, the third 30 ft. 20%, the fourth 30 ft. 10%.

In Raymond, Wash., the assessments can be paid in as many annual instalments as the years for which the bonds are issued (not over 10 years) less two.

Oshkosh, Wis., assesses benefits and damages on all except city property and crossings up to \$3.00 per sq. yd., assessed by front or average width of lot.

In Waukesha, Wis., if paving is by petition assessment is by the front foot. If it is involuntary, benefits and damages are assessed.

### California Street Paving Discussed

In the recent convention of the League of California Municipalities the matter of pavements for city streets was discussed. C. C. Kennedy, formerly city engineer of Berkeley, leading the discussion.

Mr. Kennedy stated that he believed only two types of pavement were practicable under California conditions, the asphaltic type and the hydraulic cement type, or a combination of the two. In all types of pavements the bearing power is furnished by rock and rock products, which are necessarily more or less local in origin, and failures of pavements have been due to lack of stability within the mass of these materials. The aim is to determine the most economical method for making the materials stable.

The cost of a pavement includes first cost, maintenance cost and renewal cost, combining to form the structural cost. In addition there is the unit cost of transportation over the pavement. The latter has not yet received sufficient attention. The tractive resistance to a load represents less than 20 per cent of the actual cost of transportation, mechanical repairs, the wear on tires and other features being represented by the remaining 80 per cent.

There is a third feature to be considered in economy of pavement and that is the interruption to business during construction, renewal and maintenance work on pavements. Mr. Kennedy cited the instance of a station selling automobile supplies which, when the street leading past it was being paved, lost \$100 a day due to decrease in business during the period of such construction. This was but one concern on the street and it is readily seen that the loss by all the business establishments affected by the closing or partial closing of a street during construction or repairs might total to a very large amount for each day that the street is wholly or partly closed to traffic.

In the matter of maintenance, the problem of the small city differs from that of the large one,

in that the former cannot afford to maintain a municipal organization for maintenance and repair, and therefore should give preference to a pavement which does not require a special maintenance organization. "As a general principle it might be stated that in a small community a more permanent type of improvement is economically a sounder type to construct."

Discussing the history of asphaltic pavements in California, the author stated "there are cases of failures, but I think nearly all failures of asphaltic macadam type have been due to insufficient care in drainage of the subgrade, insufficient care in the selection of the type of rock, and insufficient care in the actual manipulation of the application of the material. There is quite probably a limit to the amount of traffic which such a road can carry economically. Nevertheless, for communities which are demanding the improvement of streets throughout all their districts, there is no question but that this type today offers a great possibility for a municipality in residential districts."

Concerning hydraulic cement concrete pavement, he stated that no pavement is permanent and that a concrete pavement like others must be maintained and repaired. Even where structural conditions are perfect the impact of traffic will cause the failure of the surface from fatigue, when surface patching will no longer suffice. When extensive repair on concrete roads is necessary, the most logical method is surfacing with bituminous material.

Mr. Kennedy had found most concrete to be sufficiently porous to exert capillary attraction on the subgrade moisture, and in all cases where he had investigated failure of asphalt surfaces on concrete base, he had never failed to find moisture on the top of the concrete beneath the asphalt when movement of the asphaltic surface had occurred. Therefore the securing of impermeability in the base, or concrete pavement to be used later as a base, is a very important matter. This would seem to be an argument in favor of bituminous base in place of cement concrete. In removing an asphalt wearing surface from a concrete base he had noticed not only the presence of moisture on top of the concrete but also that there was apparently no "life" to the bottom of the asphalt mixture and that the volatile materials appeared to be confined to the top three-quarters of an inch. Apparently an emulsion with the water was formed at the bottom of the asphalt material, which removed the cementing power of the asphalt.

Concerning the effect of gasoline on asphalt pavements, S. B. W. McNab of San Bernardino stated that ten years ago they had had trouble with asphalt being dissolved out of the pavement by gasoline and were much alarmed about the matter, but found that after a time the pavement hardened and afterwards stood the dripping of gasoline as well as a concrete pavement would. This instance was cited in corroboration of a statement by Mr. Kennedy that a single case of leakage of gasoline probably would not seriously damage a pavement, because if it was not removed but was left in place it would harden with the evaporation of the gasoline.

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### Assessments for Paving

In response to a number of requests for the information, we included in this year's paving questionnaire inquiries concerning the amount of paving costs that is assessed against abutting property and certain details of the methods employed. A part of the replies appear in this week's issue, and the rest will be published next week and the week following.

These show no universal or even general practice as to methods except that the great majority base the assessment on the front foot rather than the area of the abutting property. But the part of the cost assessed varies from nothing to all, one-half and two-thirds being popular fractions. Some include and some exclude the street intersections; some assess for repaving, others do not; various plans are employed to assess for side street frontages; some assess for a certain fixed width of pavement.

Apparently very few employ the plan that seems to us most logical—that of assessing against all residential property a fixed sum per front foot, such sum being the average cost of a type and width of pavement suitable for a purely residential street with no through traffic.

In a number of states state laws fix certain of the

essential features of the assessment, some of which are evident from the replies tabulated, as in the cases of Indiana, Iowa and Ohio.

### Highway Construction and Labor

Two-thirds of the money spent on highway construction goes to labor—nearly half of it directly to the laborers employed on the road, the rest to labor used in producing the material and transporting it.

This is the average of more than three thousand miles built by Federal aid. Some road will use less labor, some more. But Mr. Pennybacker shows in this issue that, of the more than a billion dollars available for paving this year, \$660,000,000 will reach the laborers almost directly in the form of wages. This should help some in solving the unemployment problem.

### Brisk Highway Bidding

An indication of the correctness of our belief, stated last week, that bids on public work would be more numerous and lower than a year ago is furnished by the letting held a few days ago for road and bridge work in Randolph County, Missouri.

The engineer's estimate of cost was made in May of last year, and three bids were less than sixty per cent. of that estimate for the entire work, while nine were under sixty-one per cent. for the road work alone. The total number of bidders was 22 on the road work and 23 on bridge work.

The closeness of the bidding is indicated by the fact that thirteen of the bids were within 20 per cent. of the lowest on the road work alone, and eleven on bridge work alone, which was of reinforced concrete.

This was a small contract as highway contracts run now—the low bid was \$37,734—and the fact that so many bidders came from four states to bid on it would seem to indicate that there are plenty of contractors in the field for work this spring.

### A Good Record

During its existence of less than two and a half years the Associated General Contractors of America has done much to co-ordinate construction interests, to equalize and standardize various construction features in different localities, to improve construction standards and the *esprit de corps* to the advantage of contractors themselves and to a public benefit fully justifying its existence and indicative of increasing future prestige.

It has provided a sort of federation of individual, corporate and sectional contractors' associations that has materially benefited the component elements of the association, affording them co-operative advantages and reducing some of their difficulties and expenses while it has provided the central national organization that is being developed to a potentiality of great public and technical benefit.

It has become a dignified and authoritative organization of good repute and acknowledged influence recognized by the state and federal governments and by other national organizations with

which it co-operates. Its creation and development have been warmly endorsed and promoted by PUBLIC WORKS, and especially by its component journal, "CONTRACTING," which always labored strenuously to inspire, promote, and assist such an organization. It is the earnest wish and expectation of PUBLIC WORKS that the A. G. C. increase continuously in power, in prestige and in efficiency that may even make it within a brief time an instrument of tremendous power in rehabilitating the construction industry and establishing it on a safe and honest basis for continuous prosperity.

Among the excellent results of the convention in Cleveland, January 17, were three especially important resolutions that were passed instructing the executive board to make an immediate survey of the question of apprenticing the building trade, to secure sufficient apprentices for future needs; endorsing the preparation of plans for public works well in advance of construction; and the approval of an open market for all materials and opposition to all combinations to fix prices or to limit employment to any class or organization or persons.

## Discussion of "Sewage Treatment in Imhoff Tanks"

Editor of PUBLIC WORKS:

In response to a request of Mr. Riker, I beg to offer a brief comment on the subject-matter of his timely article relative to the Imhoff tank, which recently appeared in PUBLIC WORKS.

The very prevalent faults of the two-story tank enumerated in Mr. Riker's article will probably be conceded by most engineers. The portions of his paper of greatest interest to me are those referring to the probable causes of the difficulties described and suggestions for their alleviation or avoidance.

From observation, I have come to the conclusion that foaming and related difficulties arise from a combination of high viscosity of the liquid in the lower compartment and the concentration of escaping gases at the vents. Like Mr. Riker, I fail to see that there is any great difference in bacterial action in single-story and two-story tanks. The liquid in the lower chamber remains unrenewed for considerable lengths of time and in continuous contact with masses of decomposing organic matter, some of which is always entering into solution. The liquid becomes surcharged with soluble matter. Its specific gravity increases. Particles which settle readily in the upper chamber, where the specific gravity of the liquid is less, will not settle in the lower chamber. Matter previously deposited in the lower chamber will float and intensify scum formation or become semi-buoyant and distributed throughout the liquor, as the specific gravity increases. Gas-buoyed matters are retained in increasing quantities throughout the liquid, being unable to escape as in the single-story tank. Under these circumstances, more or less intercommunication takes place through the settling slot and balanced solids find their way into the flowing-through chamber. Escaping gases form bubbles and froth at the surface of the viscous liquid in the vents, and entrain scum and suspended matters, the foaming being intensified by small vents, or the restriction of relatively large ones by scum. Excessive accumulations of scum and restrained gas may extend down to, and escape up through, the slot.

This foaming in Imhoff tanks is, I think, somewhat analogous to the priming or foaming in steam boilers. To quote Rogers' "Manual of Industrial Chemistry": "Foaming results when anything prevents the free escape of steam from the water and the principal cause of it is believed to be an excess of dissolved matter

that increases the surface tension of the liquid—." That is, the concentration of dissolved matters brought about by the distillation process of steam formation, increases the viscosity of the boiler contents to a point where foaming occurs. Oil on the surface will also increase the surface tension. "Blowing off is about the only practicable means of preventing foaming—." In the process of blowing off, only a part of the water is removed.

Similarly, the remedy for Imhoff tank foaming appears to be the partial replacement or dilution of the liquid in the lower compartment, and the removal of scum from the vents. This may be done from time to time or continuously. A simple method of accomplishing periodical dilution is by frequent withdrawals through the sludge pipes, by which a part of the thickened liquor is removed and replaced by fresh sewage by way of the settling slot. This also reduces the volume of the fermenting sludge and curtails gas production. The scum difficulties are left untouched. But this deprives the tank of one of its most important functions—sludge digestion—which has been secured at a considerable additional construction cost.

Continuous dilution may be effected by the diversion of a portion of the effluent to the lower chamber, somewhat after Travis' original design. If I recollect rightly, Mr. Alexander Potter embodied this in one or more of his early designs. Mr. W. G. Kirchoffer states that he has corrected the difficulties at several Wisconsin tanks by introducing the fresh sewage into the lower chamber. To what extent the effluent may have been rendered odorous, or the characteristic Imhoff sludge affected by this arrangement, I do not know. Provision may be made for scum removal.

A more complete method of effecting periodical dilution consists in temporarily closing the tank outlet and withdrawing the scum and a part of the thickened liquor through gated openings along the vents. The discharge is delivered through a steeply sloping channel to the sludge bed. Fresh sewage flows down through the slot to replace the liquor withdrawn, giving the desired dilution. The sludge remains undisturbed. Unless the plant is isolated, the sludge bed should, in my opinion, be of the covered type to avoid nuisance. This arrangement is along the lines of the Westmont tank, but may be so designed that no pipes or troughs are placed in the vents.

The experience at Oaklyn, where an excessive withdrawal of sludge caused foaming, seems to contradict the foregoing explanation. Mr. F. E. Daniels of the Penn. State Dept. of Health, cites cases similar to this one at Oaklyn, and states that it appears to be necessary to draw the sewage level well down in the tank to bring about foaming. Nevertheless, the bulk of the foaming data tends to indicate, in my opinion, the probability of the general correctness of the theory advanced above, though doubtless the action is not as simple as I have indicated and unknown factors may at times produce unexpected developments.

Instead of attempting to use the two-story tank as a primary unit, with corrections as described, it may be used as a relatively small secondary unit to correct the unloading of a single-story septic tank. Placed in series, a short-period Imhoff unit, with a disproportionately large sludge chamber, will act as a trap tank to intercept and retain the solids unloaded by the primary unit. A secondary Imhoff unit, receiving decomposed sewage, will not foam and produces little scum. The solids unloaded by the primary tank will settle if agitated sufficiently to release entrained gases. Such agitation can be simply secured between the two units. If the secondary unit is of the single-story type, it will itself unload as soon as septic conditions become re-established in it, although not so vigorously as the primary unit. This was clearly shown by the earlier Columbus experience. The arrangement suggested does not remove the objection to a foul-smelling effluent, unless the primary unit is designed to permit but a limited detention period.

The writer has, in general, avoided the use of primary Imhoff tanks.

Respectfully,

Waldo S. Coulter.

## Homemade Paver-Charging Equipment

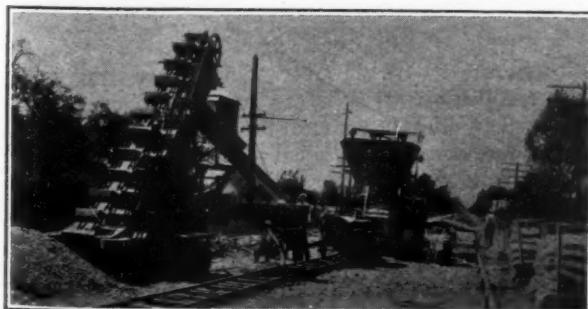
**Dump body mounted on old Ford car, and flanged wheels attached, dumps directly from industrial track into skip**

In the construction last season of the 7-mile section of concrete roadway for the National Old Trail in Hancock County, Indiana, the C. M. Kirkpatrick Co., Indianapolis, contractor, facilitated the work by the use of a mechanical loader and a specially designed home-made equipment for transferring aggregate and cement from sub-grade storage and charging it into the mixing machine in a rapid and continuous manner involving a minimum of hand labor. This equipment enabled the 18-foot pavement 6 to 8 inches thick to be concreted at an average rate of 417 linear feet per 10-hour day by a total force of only 22 men.

Sand and gravel were derived from a pit owned by the contractor adjacent to an electric car line that paralleled the highway and delivered the aggregate, which was stored in alternate piles on the subgrade on one side of the highway while the other side was left free for trucks to deliver the cement bags which were piled on slightly elevated platforms and carefully covered by tarpaulins, on the shoulders of the road. The platforms were mounted on skids easily hauled forward as the work advanced.

The cement and aggregate were hauled to the paver over a 100-foot section of 24-inch gauge industrial track with 2x6-inch ties having their ends fastened to and supported on a pair of 2x4-inch wooden stringers. A 3-foot section of the forward end of the industrial track was hinged so that it could easily be revolved back and forth and lie in the bottom of the charging skip when the latter was lowered to the ground and be quickly moved clear of it when the skip was raised to charge the paver. As the paver advanced the track was moved forward as a unit by a single horse and tackle.

The gravel was reclaimed from the stock piles on subgrade by a Barber-Greene loader with measuring box that delivered to the special delivery car, which also received sand shoveled by hand from the sub-grade stockpile by three men who filled a couple of elevated tilting boxes that dumped into the car. Cement was placed in the batch car by two men.



MEASURING AND LOADING SAND AND GRAVEL.

The car made a round trip, delivering the material to the mixer and returning for another load in one minute.

The material car was of special design and of home-made construction, utilizing the power plant and transmission drive shaft and rear axle of an old Ford car which were mounted in a new frame with flanged cast wheels. The old Ford rear axle was fitted with a sprocket wheel and chain drive, operating the rear wheels of the new car and giving it independent locomotion at good speed.

The broad dump body, resembling an ordinary skip mounted on the rear of the car, was balanced so as to dump automatically when the catch was released. The forward end of the industrial track was raised about 15 inches so as to give the car sufficient elevation to enable the dump body to revolve into an almost vertical position, insuring the rapid and complete discharge of its contents.

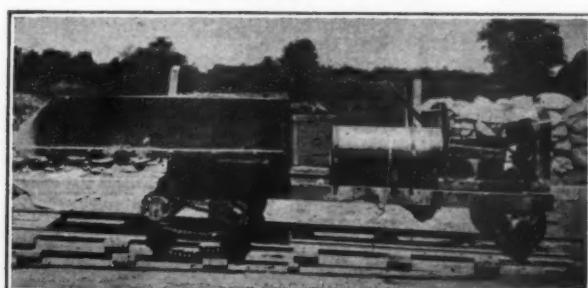
The entire plant was operated by 22 men, including one operator and 2 helpers on the Barber-Greene loader, 3 sand shovels, 2 cement men, 1 man operating charging car, 2 men spreading wet concrete, 3 men finishing, tamping and rolling concrete, 1 man operating paver, 2 men on fine grading, 1 man with team, 1 man covering concrete with straw and 1 man sprinkling it, and a foreman.

With this force the daily average progress for a 10-hour shift was 830 square yards or 170 cubic yards, equivalent to a batch every 2 minutes and 1 second. The maximum record was 1088 square yards or 222 cubic yards, equivalent to one batch in every 93 seconds. A total of 77,354 square yards of this pavement was laid in 1921 under the direction of Ross Cox, superintendent.

The use of the loader saved the wages of 5 men and the equipment described was developed from the use of a small dump car pushed by hand over a short narrow-gauge track to convey materials to the paver. This answered so well for small work using a small paver that the system above described was installed and worked economically and satisfactorily for the large paver.

### Municipal Garbage Collection Abandoned

Hamilton, Ohio, a city of about 40,000 population, has been forced to exercise the strictest economy because of the Ohio law forbidding deficits in operating expenses of cities in that state. The police force has been reduced to 12 from more than 40. Garbage collection last year cost the city



LOCOMOTIVE MATERIAL CAR SERVING PAVER.

\$36,000 but this year is abandoned entirely as a municipal enterprise, each householder being required to arrange for the removal of his own garbage. A collector arranges for removing the garbage at a charge of 15 cents per week per residence.

## Associated General Contractors

### Resolutions adopted by the convention of this society at Cleveland

The Committee on Resolutions reported among others, the following resolutions, which were adopted:

The A. G. C. declared itself opposed to raising wages in foreign territory. The Committee on Ethics was directed to adopt as part of the Code of Practice set forth in Art. V of the Rules of Procedure, a section embodying this attitude.

The Executive Board was instructed to make an immediate survey of the question of apprenticeship in the building trades in order to modify the present system and secure sufficient apprentices for future needs.

The preparation of plans for public works well in advance of construction was endorsed.

The leadership in removing restrictions which prevent American youth from adopting employment in construction as a life work was accepted for the A. G. C.

The abolition of advertisements which tend to misinform as to costs of construction was urged.

The adoption generally of a program for the increase of such facilities as transportation, irrigation and reclamation, hydro-electric and internal waterways development was recommended.

Public cooperation to provide transportation facilities and unified freight terminals was urged.

The creation by the Federal Government and by the States of departments to direct all features of physical development in territory under such jurisdiction was urged.

Cooperation between all elements of the construction industry—manufacturers, engineers, architects and builders—was urged toward recognition of the public interests, with publication of all facts relating to the organization and activities of each industry.

The President of this Association was instructed to call the attention of the Federal Reserve Board to the necessity of allocating sufficient funds to permit the construction of projects needed by the public.

Unqualified approval of an open market for all materials, and opposition to all combinations to fix prices or to limit employment to any class or organization of persons, was declared.

The expression of sympathy with the Lockwood and Dailey investigations was renewed. The Committee on Ethics was requested to include in the Code of Ethics of the Association a statement of principles, that none who adopt the standard of this association shall engage in illegal trade practices. The publication of these principles to acquaint the public with the high standards maintained by this association, and the display by members of the Association of the seal and motto of the A. G. C. as

pledge of their consecration to high standards, were urged.

### SUGGESTED PROGRAM FOR 1922

Participate actively in work of Permanent Construction Committee of Department of Commerce to establish national standards for the construction industry; urge fall lettings of highway officials' works; secure joint conference of highway officials on highway problems; urge construction of reclamation and public works by contract; urge award of contracts on a basis of skill, integrity and responsibility.

### LEGISLATION

Follow bond premium case to Supreme Court; urge National Department of Public Works; urge passage Navy contractors' relief bill; urge passage War Department contractors' relief bill; urge effective water power development act and provision for proper functioning of Federal Power Commission; secure adequate railroad legislation; secure passage of constructive immigration legislation; urge revision of detrimental State laws affecting highway work.

### METHODS

Hold conference of Construction Cost Accountants to develop standard system of cost accounting; develop standard estimating forms for builders and highway contractors, quantity take-off rules, estimating guide sheet for buildings, highways, etc.; urge payment for estimating where quantities not given; extend equipment rental schedule; hold conference on standardization of equipment; study and begin standardization of construction methods.

### CONTRACTS

Develop universal document and standard contracts; urge award of contracts on basis of skill, integrity and responsibility; complete an equitable equipment rental lease.

### LABOR

Urge reorganization of labor unions into fewer branches, including related crafts; urge revision of apprenticeship rules and increase number of apprentices; maintain National Board for Jurisdictional Awards in the building industry; secure special construction engineer for Construction Division of National Safety Council; urge standard construction safety code; urge creation of national Conference board.

### TRANSPORTATION AND MATERIALS

Secure reduction in freight rates on construction materials; secure restriction or elimination of preferential allocation of cars, to provide equal sharing by all industries; secure free wholesale market for materials; secure elimination of inequitable trade practices, affecting terms of sales, delivery and payment.

### MISCELLANEOUS

Co-operate with Hoover Committee to standardize codes; study existing laws on codes—State, municipal, Federal; extend the Contractors' Service Corporation among local chapters; revise, systematize and standardize Compensation Insurance, Classification and Rates; study existing insurance and surety laws—State, municipal and Federal; formulate and issue Code of Ethics for contractors and relations with sub-contractors; develop research work and investigation, especially in methods, contracts, and materials, legislation and transportation.

# Recent Legal Decisions

## BIDS MUST CONFORM TO PUBLISHED NOTICE TO BIDDERS

A notice inviting bids for the furnishing of a truck to be used in the fire department of a city specified a two-wheel, front-drive aerial truck of not less than 100 horse power. A bidder proposed to furnish a machine of an entirely different character as a substitute for that described in the notice to bidders, at a lower price than the bidders according to the specifications published. The statute did not require the publication of specifications, but it was done in this case, and all bidders had equal opportunity to learn the character of the truck desired. The New Jersey Supreme Court holds, International Motor Co. v. Mayor, etc., of City of Plainfield, 115 Atl. 391, that the city was not required to consider this proposal. The "lowest bidder," within a statute requiring municipal contracts to be awarded to the lowest bidder, must be a bidder who conforms to the requirements of the notice to bidders, and not one who proposes a substitute not conforming to the published specifications. The reservation by the common council of a city of the right to determine which of different trucks offered is best for the city, is limited to proposals for a truck of the required character, and the legality of the reservation cannot be questioned by a bidder whose proposal does not comply with the notice to bidders, for he has no right to compel the acceptance of his bid, and no interest in the determination of the question between other bidders whose proposals conform to the specifications. Whatever rights the latter may have do not concern it, for it was not a proper bidder.

## AUTHORIZING CONSTRUCTION OF STREET RAILWAY LINE HELD A MUNICIPAL, NOT A COURT QUESTION

In a suit by residents of a city street to enjoin the installation of a double-track street railway in the street, the Michigan Supreme Court holds, Van Baalen v. City of Detroit, 185 N. W. 883, that, under the facts of the case, the conferring of the authority to construct the line and to widen the pavement because of changed conditions, was a municipal question and not a question for the courts. The court added that: "The possibility of being obliged to submit to the construction of a street railway in front of one's residence is one of the penalties of living in a growing city."

## CONSTRUCTION OF JOINT ADVENTURE AGREEMENT TO CONTRACT FOR GOVERNMENT WORK

In an action by the two members of a firm doing a contract business constructing and building roads against another construction company, the evidence showed that the plaintiffs were invited by the defendant to join in procuring a road construction contract with the government, and to become jointly interested therein; that they assisted in procuring the contract, and turned in their road constructing outfit. The contract with the government provided for additional work and for changes in the plans from time to time. The defendant objected that a payment by the govern-

ment for the work done in cleaning the Salada creek in connection with mosquito prevention, and work done in building a dam across the Salada for the construction of a swimming hole for the soldiers at Camp Travis, was not within the contemplation of the parties when they entered into the agreement to share the profits. The Texas Court of Civil Appeals held, Failey Method Co. v. Kelly, 235 S. W. 250, that, the evidence showing that all the work performed with the government was done under the contract which the plaintiff had assisted to procure, and no other, and that all payments were made for work done and performed under the terms of this contract, and no other, the plaintiffs were entitled to participate in the profits of the items mentioned.

## PROOF OF AMOUNT OF STONE FURNISHED ROAD CONTRACTOR BY MATERIALMAN

In an action by a materialman on a highway contractor's bond for the balance due for stone furnished the contractor, the plaintiff claimed delivery of 15,166 cubic yards. The defendant admitted receipt of 10,738. The trial court found that 13,775 cubic yards were delivered. The defendant's claim was that the total amount of stone required to construct the highway as finished was but 10,738 cubic yards; but its expert witnesses differed somewhat as to the amount required, owing to their making a slightly different percentage allowance for compression. They both stated that their figures were dependent upon the subgrade being perfectly level and so prepared that but six inches of solid material were at any time needed to make the surface conform to the contracts and specifications. In view of the uncertainty of the proof as to the exact number of cubic yards delivered or required to construct the road, the Michigan Supreme Court, in Producers' Stone & Gravel Co. v. Chicago Bonding & Surety Co., 185 N. W. 703, sustained the finding of the trial court on this point.

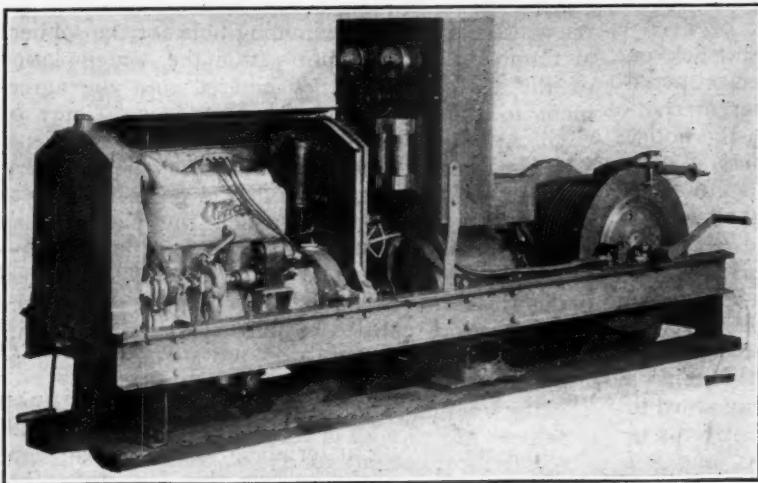
It was held that the fact that the specifications were referred to as to the kind and quality and amount of stone required by the contractor to perform the contract with the municipality did not make the plaintiff a subcontractor, there being no showing that the plaintiff undertook to perform any part of that contract.

## EXTENT OF DELEGATED POWER OF MUNICIPALITY TO CHANGE CONTRACT RATES

The New York Appellate Division holds, Tonawanda Board & Paper Co. v. City of Tonawanda, 190 N. Y. Supp. 874, that while the statute delegating power to a municipality to regulate rates becomes a part of a contract between the municipality and a consumer for the supply of water, that power may only be exercised when it appears that the rate agreed upon is not just and reasonable under the circumstances, and it may not be exercised capriciously or arbitrarily. The municipality has the burden of proving its right to change the contract rate, and must propose or establish a rate that is just and reasonable in its place.

# New Appliances

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations



"CAPITOL" GASO-ELECTRIC THAWING SET

#### CAPITOL PIPE THAWER

The Capitol Gaso-electric Thawing set built by the Auto Engine Works is a portable plant, mounted on a truck and intended for electrically thawing frozen service underground water pipes. It is equipped with a generator and its operating engine, and furnishes electricity to the reeled cable, one end of which is connected to the nearest fire hydrant and the other end to the generator and to the service pipe in the building, thus providing a complete circuit for the current, which is regulated to provide sufficient electric resistance in the service pipe to thaw it out in from 5 to 15 minutes, average 11 minutes per thaw.

The 35-h.p. engine is equipped with speed control, and the generator furnishes a current of 20 kilowatts. Ter-

minal fittings are made universal, connected to all existing connections and the reel is arranged to reel out the required length of the cable and reel it up again. The truck is 10 feet long, weighs approximately 2,800 pounds and is equipped with 500 feet of cable.

#### DUMP WAGONS FOR REFUSE

This dump wagon especially designed for handling refuse, is manufactured by John H. Holzboog & Bro., who claim for it extra large capacity, low hanging bed, light weight and end dump. It is made in a 1-horse size of 3 yards capacity and a 2-horse size of 5 yards capacity. The body is dumped by a toggle arrangement, operated by a hand windlass and is pivoted near the rear end at a point, which permits the body to be elevated into a nearly vertical position with the lower

ends at or near ground level. It is claimed to be especially adapted for dumping into barges and hauling to incinerators and is arranged to be hauled by horses for the convenient collection of refuse from house to house, after which at a common meeting place the horse poles can be readily shifted for short trailer poles and a string of wagons hauled as trailers by a motor truck, to a remote destination.

#### REFDFLEX HIGHWAY DANGER SIGNALS

This signal contains no light or mechanism. When approached by automobile lights it appears to be a huge, brilliant red light. It has 144 lenses, reflecting 12 square inches of light and functions through fog, mist or rain. It is easily installed and requires no attention; it is manufactured by the Automatic Signal & Sign Co.

#### THE REFLECTO-LUX LANTERN

The Westinghouse Electric & Manufacturing Company has recently developed a post top of novel design for use with Mazda "C" lamps. The quality of the light emitted by the Reflecto-Lux units is brilliant and sparkling, and they have been designed to distribute a flood of light on the streets, with a small amount upwards to light the fronts of the adjacent buildings. The maximum light is emitted at approximately 20 degrees below the horizontal and the distribution is ideal for mounting heights and spacings customary with ornamental street lighting.

The distribution is obtained by upper and lower parabolic reflectors, which direct the light outwards and, in addition, a portion of the light in the upper



HOLZBOOG DUMP WAGON FOR HAULING REFUSE



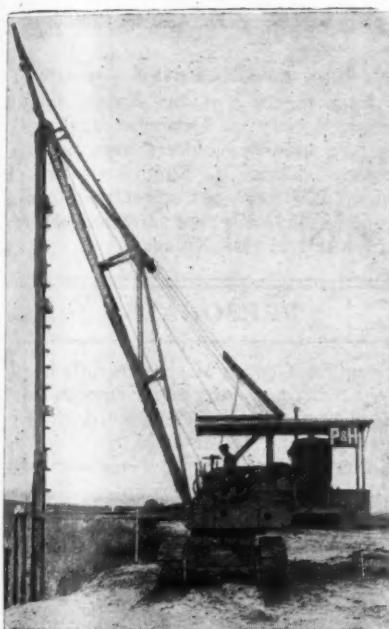
REFLECTO-LUX LANTERN FOR EFFECTIVE STREET LIGHTING

hemisphere is re-directed by an opal glass band around the upper hemisphere of the lamp, or by a band of enamel on the lamp itself.

The construction of the Reflecto-Lux units is rugged, the frame is of galvanized cast iron, and the glass panels are set in felt gaskets, making the whole thoroughly dust-proof. In the post top, the lamp burns in a "tip up" position and is readily accessible for cleaning and replacement through the hinged top cover. In the pendant unit, the lamp burns "tip down" and access is obtained to the interior of the lantern through the bottom casting, which is hinged.

#### NEW PILE-DRIVING ATTACHMENT FOR P & H EXCAVATOR-CRANES

To extend still further the application of P & H Excavator-Cranes, a new pile-driving attachment has been developed by the Pawling & Harnischfeger Co. This can be used in



PAWLING & HARNISCHFEGER PILE-DRIVING ATTACHMENT FOR EXCAVATOR CRANES

place of the Standard Boom, the same as the Shovel Attachment and Road-grading S'immer Scoop. These P & H machines have been used for pile-driving work before by contractors who rigged up their own pile-driving attachment. The new standardized attachment makes unnecessary this work and makes it possible to change over in shorter time.

The construction as shown in the accompanying illustration consists of two offsetting brackets hinged on the sheave wheel pin at the head of the boom, with horizontal bracing below. The weight of the hammer is 1964 pounds and of the follower 781 pounds. The entire machine can be moved from pile to pile by the same

operator, since the attachment is made for use with either 205 or the 206 corduroy traction machine.

#### MILWAUKEE SNOW CONVEYOR

This machine, manufactured by the Snow Conveyor Co., will cut a road 9 feet 7 inches wide through light, heavy or packed snow at a speed of 1 to 10 miles per hour, maintaining an average of 6 miles for ordinary conditions. On concrete roads it makes a clean sweep and on dirt roads can be regulated to leave a blanket of snow of from 1 to 10 inches in depth. At high speed the conveyor can travel 1,800 feet per minute, throwing snow 10 to 40 feet to the side of the highway, according to wind resistance.

The machine is 16 feet long, 9 feet 7 inches wide and 9 feet high over all, weighs 9,500 pounds, has a 50 h. p. motor and a 28-gallon tank.

#### INDUSTRIAL NOTES

##### THE SANITARY CITY

The Way-cleanse Corp., bulletin is devoted to the gas-electric suction street sweeper, emphasizing the necessity of removing germs contained in dust from the city streets and the vast amount collected by this vacuum sweeper which has a combination gas and electric drive and straight mechanical device giving a wide range of vehicle speed and various speeds for the broom, blower, and auxiliary motors, with simplified controls. The machines travel at from 2 to 6 miles per hour, separating the dust so effectively that none whatever is in evidence while the streets are being swept. The machines are climbing the steepest grade in Sandusky without stalling. One machine removed more than 8,000 pounds of litter, sand and fine flour-like dust from about 27,000 square yards of pavement after the latter had been cleaned on the same day by the old city methods. St. Louis is now using four Way-cleanse machines and wants 16 more, sufficient to handle 50,000,000 pounds of street dust annually.

##### THEORETICAL AND PRACTICAL CO-ORDINATION

The Kissel Motor Car Company issues a bulletin showing how the Kissel Engineering Service is increasing road building efficiency by means of its road division and engineering organizations to design and manufacture road building trucks and equipment. They have originated and developed exclusive features to eliminate loss of time and labor by tables used for the construction of properly designed aggregate transportation, material handling, truck turntables and aggregate hopper with multiple measuring gate for rapidly

loading batch boxes and compartment trucks.

The special trucks and truck turntables used for the construction of five miles of 18-foot concrete road at Watertown, Wisc. enabled the contractor to handle a bucket of material to storage bin every 35 seconds, charge 9 measuring boxes every 12 seconds; load a 3-box truck in 25 seconds, reverse the truck on the turntable in 10 seconds; haul the load at a speed of 30 miles per hour; and dump the three batches into the mixing machine skip in 4 minutes.

#### HEIL COMPANY GOOD ROADS EXHIBIT

The exhibit of the Heil Co. at the Chicago Good Roads Show displayed a larger number of truck bodies and hoists than were shown by any other manufacturer. They included hoists mounted on Atterbury, Mack, Parker, Harvey, Stoughton, Indiana, Kissel, F. W. D., and Republic trucks, and received many orders from contractors throughout the country. Much attention was attracted by a miniature truck 6 feet long built to a scale of 1:3. It was complete in every detail, beautifully finished and operated perfectly. It was mounted on an ordinary table, making it very convenient to examine the mechanism and particularly to observe the operations of the hoisting and dump-device.

The exhibit also included samples of the Heil gravity dump body with a hand hoist on a convenient bench, and a large album or swinging racks for photographs of Heil trucks in service.

A specially interesting feature of the exhibit was the Heil swinging truck body partition that is claimed to be the most simple one on the market, and when raised swings open.

#### RATHBUN GAS ENGINES

The Rathbun Jones Engineering Co. has appointed the Ingersoll-Rand Co., New York, general sales agent for Rathbun gas engines. Rathbun gas engines have been in successive operation for over 20 years. They are of the vertical, multi-cylinder type and are built to operate on natural, illuminating, producer, coke oven, oil still and other forms of gases which can be successfully handled in an internal combustion engine. Sizes range from 100-brake horse power to 1,450-brake horse power.

#### OPENS BRANCH OFFICE AT ALBANY

In line with its recent action in opening branch offices at Raleigh, N. C., with Harry P. Grier in charge, and at Atlanta, Ga., with James R. Valk in charge, the Asphalt Association, J. E. Pennybacker, secretary, carrying out its policy of expansion, has moved its Canadian office from Toronto to Albany, N. Y., where Germain P. Graham, formerly deputy city engineer of Albany, will be in charge as district engineer.

## NEWS OF THE SOCIETIES

### CALENDAR

**Mar. 1-3**—ONTARIO GOOD ROADS ASSOCIATION. Toronto.

**Mar. 14-16**—AMERICAN RAILWAY ENGINEERING ASSOCIATION. Annual convention, Chicago, Ill.

**Mar. 15**—NEW YORK SECTION, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Engineering Societies Bldg., New York City.

**Mar. 18**—ROCHESTER ENGINEERING SOCIETY. Quarter-centennial dinner.

**Mar. 23-24**—ILLINOIS SECTION, AMERICAN WATER WORKS ASSOCIATION. Fourteenth annual meeting, Urbana, Ill.

**Apr. 19-21**—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. General meeting, Chicago, Ill.

**Apr. 19-21**—TRI-STATE WATER AND LIGHT ASSOCIATION OF THE CAROLINAS AND GEORGIA. Spartanburg, S. C.

**Apr. 27-30**—BUILDING OFFICIALS' CONFERENCE. Apr. 27-28, Cleveland, O.; Apr. 29, Massillon, O.; Apr. 30, Youngstown, O.

**May 15-19**—AMERICAN WATER WORKS ASSOCIATION. Annual convention, Philadelphia, Pa.

**June 4-6**—AMERICAN ASSOCIATION OF ENGINEERS. 8th Annual Convention, Salt Lake City, Utah.

**June 13-16**—CANADIAN GOOD ROADS ASSOCIATION. Annual convention, Victoria, B. C.

**June 26-July 1**—AMERICAN SOCIETY FOR TESTING MATERIALS. 25th annual meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

**Sept. 25-28**—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention, Hot Springs, Ark.

### AMERICAN ASSOCIATION OF ENGINEERS

A special bulletin reviewing the work accomplished by the Association during 1921, called attention to a number of important activities.

It held the first national conference on engineering publicity and secured more than 300 columns of newspaper display.

It liberally supported a reorganization of the department of the government on a basis of greater efficiency. It advocated the appointment of an engineer to the Interstate Commerce Commission. Through its Federal office, railroad section and many chapters it worked to prevent reduction of salaries of government railroad engineers, co-operated on the reclassification bill and has now a committee working on a salary of engineer service.

The association has successfully contested with several corporations releasing engineer employees with less than two weeks notice. It maintained an effective employment service which has sent out notices of more than 6,000 positions open and has placed more than 3,000 men. The committee is now making plans for a national employment service adequately financed.

Ethical standards have been promoted by the practice committee, which has passed upon ten important cases which has brought the enactment of license laws in several states to protect competent engineers and require those who wish to practice to be properly examined and registered.

### AMERICAN SOCIETY OF CIVIL ENGINEERS

The annual report of the Board of Direction, showed a total membership of 10,342, being an increase of 435 over last year. During 1921 the society lost 90 members by death and gained 743 by election. The library gained 2,429 volumes by accession, making a total of more than 157,530 volumes, maps and plans, and had an average daily attendance of 83. It made 332 searches and copies of searches and expended about \$27,000. The reading room had an attendance of 5,051, being an increase of about 23 per cent over the year 1920.

The society has co-operated its management and shared in the expense of the employment service maintained by the Federated American Engineers' Societies, by which 1,905 men were registered and 1,365 were placed. The net expenditure for publication in 1921 was \$67,510.22. The society has 34 local sections, seven of which were organized during the past year. It has 39 student chapters, of which 31 were organized during the past year.

In spite of general economical depression and a large amount of unemployment among engineers, the financial conditions of the society have continued to improve, and there is a balance on hand of \$40,906.23 remaining after the year's expenditure of \$260,730.27. The total assets of the society are inventoried at \$1,252,597.05, with a surplus of \$963,658.03; the receipts during 1921 were \$259,982.55.

### LEHIGH VALLEY SECTION, A.S.M.E.

The Lehigh Valley Section of the American Society of Mechanical Engineers at its meeting at Bethlehem on February 8th was addressed by Col. H. C. Boyden on "Recent Developments in Manufacturing of Cement," and Walter Cassia on "Placing Concrete." The subject of the meeting was "Cement and Concrete."

### DETROIT SECTION, A.S.M.E.

The Detroit Section of the American Society of Mechanical Engineers held a meeting on February 17th. This was at the same time the sixth joint meeting of the Associated Technical Societies at Detroit. The American Society of Civil Engineers and American Society of Military Engineers were in charge of the program, which

included an address by Col. J. G. Vincent on "The Trend of Aviation."

### ENGINEERS' DINNER

The thirteenth annual dinner for engineers of Boston and vicinity was held on February 7th at the Boston City Club. The following societies participated: the American Society of Civil Engineers, the Engineers' Club, the Illuminating Engineering Society, the New England Water Works' Association, the Plant Engineers' Club and the American Society of Heating and Ventilating Engineers. Col. Charles R. Gow was toastmaster; and the speakers were A. Lawrence Lowell, president of Harvard University, on "The Conference on the Limitation of Armaments" and Philip Cabot, on "The Engineer's Opportunity."

### KANSAS ENGINEERING SOCIETY

The February 8th meeting of the Kansas Engineering Society was addressed by President Mortimer E. Cooley of the Federated Engineering Societies.

### KANSAS ENGINEERING SOCIETY

At the meeting of the Kansas Engineering Society on December 22nd and 23rd, the following officers were elected: president, Lloyd B. Smith; vice-president, P. L. Brockway; secretary-treasurer, J. M. Averill; and directors P. J. Ruckel and H. B. Walker.

### PERSONALS

Coughlin, George M., has recently been chosen director of public works of Bridgeport, Conn., to succeed Jack A. Courtade.

Holmes, Harold R., city engineer and building inspector of Lockport, N. Y., has been reappointed.

Prouty, Leslie E., has been appointed county engineer of Mobile county, Ala., to succeed S. M. Adams.

Batchelder, George W., water commissioner of Worcester, Mass., has been re-elected by the common council.

Shawyer, Casper D., has been appointed city engineer of Cheyenne, Wyo.

King, Clifford M., assistant engineer in the sanitary department of the city engineer's office at Cleveland, Ohio, died on January 2nd.

Myers, Harry, has been appointed city engineer of Pittston, Pa.

H. O. Garman has entered private practice in consulting engineering and the management and operation of public utilities with offices in Indianapolis, Indiana. For more than fourteen years Mr. Garman was chief engineer of the Public Service Commission and the Railroad Commission of Indiana, serving under five governors. During this time he valued many hundreds of Indiana properties totaling more than \$300,000. Mr. Garman is national president of the American Association of Engineers.